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A SOCIOLOGIC AND MEDICAL STUDY OF FOUR HUNDRED
CIGAR WORKERS IN PHILADELPHIA.*

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Labor and Industry.)

INTRODUCTION. About one year ago the Industrial Board of the Pennsylvania State Department of Labor and Industry asked the clinic for diseases of occupation of the University Hospital for some information which might help its members to decide whether or not children under sixteen years of age should be allowed to work in banding and packing rooms of cigar factories. A review of the literature upon the effects of tobacco work was unsatisfactory, and an investigation of the cigar industry in Philadelphia was therefore planned, including a survey of the hygienic conditions of some of the factories and an intensive study of a limited number of employees. The former study appears in a separate communication,† while this one presents a review of the literature and a study of the social and medical histories and the physical examinations of 400 workers in that industry.

LITERATURE. In the first treatise upon the diseases of tradesmen, written by Ramazzini¹ in the latter part of the seventeenth

*Read before the Philadelphia County Medical Society.

†Smyth and Miller: A Hygienic Survey of Cigar Manufacturing in Philadelphia, *Med. and Surg.*, September, 1917.

century, a chapter was devoted to tobacconists or those who made snuff. The author recognized among them nervous, gastro-intestinal, and respiratory disturbances, and since his time the genital and circulatory systems have been included among those described as being affected injuriously by tobacco work. The extent of the injury done by tobacco has, however, been a disputed problem since Ramazzini's time, and the controversy has called forth numerous publications, particularly in the last half-century. Some of the writers, including Duchatalet,² Thackrah,³ and Arlidge,⁴ denied any injurious influences, while Schwabe⁵ and Piasecki⁶ even ventured to say that working in tobacco was healthful. Rochs⁷ believed that the work in sufficiently ventilated rooms was harmless, while Oliver⁸ found nothing in the French, Spanish, or British factories to lead him to regard it as an occupation dangerous to health, and Rambousek⁹ stated as late as 1913 that the industrial poisoning from tobacco was not proved. On the other hand, Merat¹⁰ believed that tobacco factories were incubators for serious disease conditions, and Rosenfeld,¹¹ who made a careful study in 1889 of the Austrian statistics, including 35,164 workers from twenty-eight factories, found high morbidity and mortality rates. Kober¹² stated that a lowering of general resistance resulted from this work.

The respiratory system seems to have attracted most attention. Ramazzini¹ spoke of the workers sneezing, and of the horses, which were used to grind the tobacco into dust, coughing and blowing their nostrils. Melier,¹³ in 1844, spoke of a transitory bronchitis among tobacco workers, but claimed that the work arrested tuberculous disease, as did also Reuf.¹⁴ Hirt¹⁵ described an irritation of the bronchial, nasal, and conjunctival mucous membranes in beginners at this work, but found no tendency to chronic catarrh, chronic pneumonia, emphysema, or tuberculosis. He exposed rabbits and dogs to tobacco dust for several months, but was never able to provoke any signs of catarrh or a loss of appetite, although at autopsy some brownish spots and some atrophic areas were found in their lungs. Merkel,¹⁶ in 1882, found fine brown spots in the lungs of tobacco workers, and after this there were many reports of lung diseases, particularly tuberculosis. Rosenfeld¹¹ stated that tuberculosis was the disease of the tobacco worker, finding 1.73 per cent. of the Austrian workers to be tuberculous, whereas the percentage among factory workers in general was only 1.25, and Schellenberg¹⁷ found that the tuberculosis death-rate of cigar workers in one town of Baden between 1887 and 1893 ranged between 1.77 and 2.7 per cent., whereas for the total population during the same period it was 0.27 to 0.29. Stephani¹⁸ found a high tuberculosis morbidity rate as well, and Abelsdorf¹⁹ declared that women were affected more frequently than men.

Hoffman²⁰ showed that the United States statistics for 1909 gave cigar makers and tobacco workers a higher death-rate from all

causes in each age group than they did the manufacturing and mechanical class or the mercantile and trading class. He presented tables for comparisons, by age groups, of the total and the tuberculosis mortality of tobacco workers with that of all occupied workers in England and Wales (1900 to 1902), which, on the whole, gave the tobacco workers a higher percentage. In some age groups, however, the reverse was true, and in Switzerland (1871 to 1890), according to statistics which he also presented, the tuberculosis mortality for tobacco workers under forty years was less than for all occupied males. He was able to show finally that the proportionate mortality from consumption among 141 tobacco workers (1897 to 1906), as indicated by the figures of an industrial insurance company, was 38.8 per cent. against 14.8 per cent. for all males in the registration area of the United States (1900 to 1906), and that the proportionate mortality from consumption among 1530 cigarmakers and packers (1897 to 1906) was 28.9 per cent. against the same 14.8 per cent. His conclusion, based on a study of the literature and the above figures, was that tobacco workers were subject to an excessive mortality from consumption and from other respiratory diseases.

Kober¹² has stated that recent United States statistics show that among twenty-three occupations tabulated cigarmakers and tobacco workers occupy second rank in mortality from tuberculosis. The proportionate mortality from tuberculosis of the lungs among cigarmakers and tobacco workers compared with that in all occupations and in other specified occupations in the registration states (1909), by age groups, is presented in Table I.²¹

TABLE I.

Age at death, years.	Cigar and to- bacco workers.	Physicians and surgeons.	Marble and stone-cutters.	Printers.	All occupations.
25 to 34 . .	49.3	21.2	46.7	51.5	31.0
35 to 44 . .	33.7	15.8	41.0	32.6	23.6
45 to 54 . .	23.2	9.2	42.9	22.3	14.4

The gastro-intestinal symptoms of tobacco workers were emphasized by Thiele,²² who claimed that the volatile oil and the nicotine of tobacco irritated the throat, producing cough, nausea, and vomiting. Nausea, diarrhea, and increase in gastric acidity were spoken of in Ramazzini's¹ original paper, while Chapman²³ described abdominal pain, constipation, and collapse. Rosenfeld¹¹ found 11.6 per cent. of the Austrian tobacco workers to be suffering from some gastro-intestinal disturbance, whereas the percentage for textile workers was 8.5, and Jehle²⁴ found similar disturbances in 20.7 per cent.

of tobacco workers, but in only 11 per cent. of other workers. Thompson²⁵ described gastro-intestinal as well as nervous and vascular symptoms, but did not rate the occupation as especially hazardous.

Anemia has been considered by many to be a result of tobacco work, and Rosenfeld¹¹ suggested a specific action of tobacco in its production. He found anemic 1.92 per cent. of cigar workers as against 0.77 per cent. of all workers, and Jehle²⁴ found 7.81 per cent. of tobacco workers with anemia, while other workers showed only 2.81 per cent. Thiele²² and Bresler²⁶ believed that these workers suffered from anemia, and the latter attributed their pelvic disturbances to this condition.

Menorrhagia was noted among tobacco workers by Patisier, Richardson, James, Kostial, Morat and Brodie, according to the New York Factory Investigating Commission,²⁷ and Rosenfeld¹¹ claimed that menstrual disorders were twice as frequent in these as in other workers; but Poisson,²³ Joire,²⁹ Piasecki,⁵ and Oliver,⁸ did not regard tobacco as an emmenagogue. Petit,³⁰ however, was able constantly to produce anatomical changes in the genital organs of animals by feeding them with tobacco, and Guillaïn and Gy³¹ produced abortions in animals by the same means. In further support of its abortifacient effect Rosenfeld¹¹ found the percentage of miscarriages higher than in other women, while Emerson and Tracy³² found the number of children in the families of tobacco workers quite small. Bresler²⁶ stated that it was known girls sought work in tobacco factories in order to bring about a termination of pregnancy, and Robinson³³ claimed that the most trifling genital lesion was enough to bring about an abortion in a tobacco worker. These facts suggested to Abelsdorf¹⁵ that nicotin had a specific abortifacient effect, but Etienne,³⁴ Piasecki,⁵ Ygonin,³⁵ Thiele,²² and Oliver³⁶ believed that tobacco had no such influence. Etienne,³⁴ however, found the infant mortality to be twice that of other families, and he as well as Kostial³⁷ and Abelsdorf¹⁵ suspected that this was due to the presence of nicotin in the mother's milk. Oliver,³⁶ on the other hand, stated that in Madrid he saw women leave their work at a certain hour to suckle their children, and that it would be difficult to see stronger and better nourished babies anywhere.

Among the nervous symptoms mentioned by Ramazzini¹ were headache, migraine, and squeamishness, and he supposed that the brain was clouded and narcotized. Thiele²² added dizziness, sleeplessness, fatigue, heaviness of the hands and feet, and hyperesthesias to this category of nervous symptoms. Strümpell³⁸ described a nicotin tabes. Caparelli³⁹ reported as a result of an intensive study of twenty-five workers in tobacco fermenting rooms a heightened blood-pressure and an influence upon cardiac rhythm.

THE CIGAR INDUSTRY IN PHILADELPHIA. During the fifteen-year period (1899 to 1914) 130 establishments for the manufacture

of tobacco products in Philadelphia either shut down or combined with other plants, but during the same time the number of employees and the value of the products increased, as Table II shows. This was due to the organization of large companies and their ability to buy the raw material and produce the cigars more economically, thus forcing out the small companies and the individual manufacturers.

TABLE II.—MANUFACTURES OF TOBACCO, CIGARS, AND CIGARETTES IN PHILADELPHIA.

Census.	Number of establishments.	Number of employees.	Total value of products.
1899 ¹⁰	556	6960	\$8,991,000
1904 ¹⁰	617	6710	8,655,000
1909 ¹⁰	496	7634	13,429,000
1914 ¹¹	426	7982	12,733,281

If the proportion of cigar workers among all the tobacco employees of the city in 1914 was the same as that given by the 1905 census of manufactures for the entire United States there were in that year 6512 of the former in Philadelphia, and the number has probably changed very little in the past two years. Almost one-half of this number, 3199, were employed in the seven factories in which we made the examinations here reported, and a greater number are included in our paper upon the hygiene of the industry. Only 400 of these, however, were subjected to our study, and they were distributed among the factories, according to processes, as is shown in Table III. A detailed description of these processes is given in the paper by Smyth and Miller.

TABLE III.—DISTRIBUTION AMONG EMPLOYERS BY SEXES AND BY PROCESSES.

Employer.	Males.				Females.				All workers.
	Cigar-makers.	Packers.	Driers.	Casers.	Cigar-makers.	Packers.	Strip-pers.	Banders.	
T. . .	33	12	11	9	23	11	11	3	113
S. . .	2	4	0	0	34	13	0	6	59
M. . .	0	0	0	0	0	33	20	0	53
B. . .	0	0	3	0	0	5	0	5	13
J. . .	0	0	0	0	19	9	18	0	46
L. . .	17	2	0	0	19	2	0	0	40
R. . .	5	0	0	0	62	0	2	7	76
Total	57	18	14	9	157	73	51	21	400

MODE OF INVESTIGATION. Although the method of conducting this investigation did not differ fundamentally perhaps from that of similar studies in other industries a statement of it is deemed

appropriate. From a list⁴² of 160 establishments for the manufacture of cigars in the city we selected 25 of the larger ones, and by means of a circular letter requested their coöperation in this study. These factories were then visited and the nature of our proposed investigation more fully explained. When we were able to talk to the superintendents or to employers who had themselves grown up in the business we found a ready welcome and a desire to coöperate; when, however, employers who had not had actual experience as employees in the industry were encountered some objections were raised, the chief one being that the employees would not permit such a study. In a few of these instances, however, a trial was permitted, and in these, as in all the factories where we once came into contact with the workers, we had no further difficulties.

The employers were in every instance most courteous, and our hearty thanks are due them for the facilities which they put at our disposal. The superintendents always brought the matter to the attention of the workers, and, as a rule, only a few would consent to the examination at first; but after a start was made there was little difficulty in seeing as many as we could examine. Our plan was for the social service worker⁴³ to see the subject first and to elicit the social and industrial history, and then to pass the worker on to the examiner, who in turn procured the medical history and made as complete a physical examination as was possible. In many instances this meant an examination of the entire body, but sometimes it meant, on account of the semipublicity of the examining room, that the lower chest and abdomen had to be omitted. Fifteen to thirty minutes were required for each individual. Blood-pressure readings were taken and urines and blood smears examined when there was any suspicion of abnormality, while on about 100 girls the blood-pressure was determined routinely, and blood smears from 50 consecutive subjects were studied.

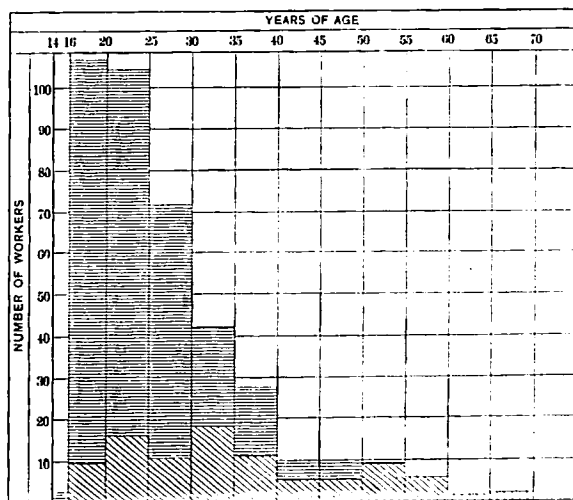
ANALYSIS OF DATA UPON WORKERS. *Sexes and Ages.* Of the 400 cigar workers included in this study 98 were males and 302 were females. Of the latter 157 were cigarmakers,* 73 packers, 51 strippers,† and 21 banders; whereas of the males, 57 were cigarmakers, 18 packers, 14 driers, and 9 casers. Table IV shows that 54.2 per cent. of them were under twenty-five years of age and 82.7 per cent. under 35. This large proportion in the early age groups is due to the female workers, since 63.5 per cent. of them were under twenty-five and 92.1 per cent. under thirty-five, while only 25.5 per cent. of the males were under twenty-five and 54.1 per cent. under thirty-five. This is shown graphically in the Chart.

* In this group of cigarmakers are included both bunch makers and rollers and both machine and hand workers.

† Applies to selectors and strippers together.

TABLE IV.—PERCENTAGE OF DISTRIBUTION, BY AGE GROUPS, ACCORDING TO SEXES AND PROCESSES, AND FOR ALL WORKERS.

Years.	Males.					Females.					All workers.
	Cigar-makers.	Pack-ers.	Drillers.	Casars.	Total.	Cigar-makers.	Pack-ers.	Strippers.	Band-ers.	Total.	
14-15	..	..	..	..	..	..	4.1	..	..	0.9	0.7
16-19	12.3	5.6	7.1	..	9.2	26.7	38.4	39.3	42.9	32.8	27.0
20-24	14.0	33.4	14.3	..	16.3	36.4	28.7	13.7	23.8	29.8	26.5
25-29	12.3	5.5	7.2	11.1	10.2	21.6	20.5	17.6	14.3	20.3	17.8
30-34	24.5	11.1	7.1	11.1	18.4	9.0	5.5	7.8	9.5	8.3	10.7
35-39	12.2	5.0	14.3	22.2	12.3	3.2	2.8	11.8	4.8	4.6	6.5
40-44	5.3	5.6	7.2	11.2	6.1	1.3	..	3.9	..	1.3	2.5
45-49	5.3	5.0	7.1	11.1	6.1	0.6	..	3.9	4.7	1.3	2.5
50-54	5.3	16.7	14.3	11.1	9.2	..	..	2.0	..	0.3	2.5
55-59	1.8	11.1	7.2	22.2	6.1	..	..	..	..	..	1.6
60-64	1.8	..	7.1	..	2.0	..	..	..	..	..	0.5
65-69	3.5	..	7.1	..	3.1	..	..	..	..	..	0.7
70-74	..	..	..	..	..	0.6	..	..	..	0.4	0.3
Unkn.	1.7	..	..	..	1.0	..	..	..	..	..	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
No.	57	18	14	9	98	157	73	51	21	302	400



Number of workers in age groups by sexes. The oblique lines represent males and the horizontal lines females.

Length of Employment. The average duration of employment in the industry would then be expected to be much greater for the males, and Table V shows this to be the case. The single longest stay in the trade, however, was that of a woman who had worked as a cigarmaker for sixty-five years. The number of years of employment in the particular factory in which examined also averaged greater for the males. The cigarmakers had been longer in the industry than the workers in any other process, with the packers occupying second position among the males and the strippers among the females. Since these are the processes requiring the greatest amount of skill it is but natural that the workers should have stayed longest in them.

TABLE V.—AVERAGE LENGTH OF TIME IN THE INDUSTRY AND IN THE FACTORY IN WHICH EXAMINED.

Years.	Males.					Females.				
	Cigar-makers.	Packers.	Drillers.	Casern.	Average.	Cigar-makers.	Packers.	Strippers.	Banders.	Average.
In the industry . . .	17.0	14.6	11.8	7.3	14.8	6.9	4.4	6.8	5.1	6.3
In the factory in which examined . . .	5.2	5.8	8.4	2.2	5.3	2.6	3.4	2.7	3.0	2.8

Nativity. A tabulation of the nativity records shows that more than half, 55.5 per cent., were born in the United States, although among 14,356 cigar workers in this country in 1913 only 21.09 per cent. were American.⁴² Russia and Austria-Hungary were the most frequent native countries of the foreign-born, and with America included 81 per cent. of the total. Of their fathers only 24.7 per cent. were born in the United States, and of their mothers 26.5 per cent., yet the order of frequency of the birthplace of the parents followed roughly that of the workers, except that Germany occupied a relatively higher position with the parents, and that Ireland, Belgium, Bulgaria, Spain, and Switzerland were represented among the parents but not among the workers themselves. According to religion Roman Catholics predominated with 45.2 per cent., Protestants and Jews being about equally divided among the others.

Civil Condition. An analysis of the civil or conjugal condition reveals that 60.5 per cent. were single, and this is to be explained by the preponderance of the subjects in the early age groups. The older ages of the men accounted for 63.2 per cent. of them being married, whereas only 29.5 per cent. of the females were or had been married. These figures may be compared with those for 13,743 cigar workers in this country in 1913, among whom 57.88 per cent.

of the males were married and 20.11 per cent. of the females.⁴² Among the women more of the strippers than of any of the other process groups were married, and this also is due to their older age distribution.

Earnings and Hours of Work. Piece rates prevailed with all the employees except the driers and casers, and the differences in the earnings of the sexes were slight. The cigarmakers of the seven factories averaged \$14 to \$18 per week of fifty-four hours, the packers \$16, the driers \$10 to \$11, the casers \$14, the strippers \$8 to \$10, and the banders \$9 to \$10. It was not uncommon to find a cigarmaker earning \$25 per week, and one young girl who did machine-cigarmaking earned \$30 regularly. These figures are in strong contrast with those presented by the United States Commissioner of Labor⁴³ in 1913, when as the result of the compilation of statistics for 13,565 cigar workers, including those from nine factories in Pennsylvania, he stated that half of the females and one-twelfth of the males earned under \$6 per week, and that only one-tenth of the women and three-fourths of the men made over \$10 per week. In addition to the large increase in all wages since that time it is probable that a better grade of cigars are made and consequently better wages are paid in the factories here considered than in the industry generally.

In this connection, too, it is to be remembered that many of the workers whom we studied seldom did full-time work of nine and three-quarter hours per day and fifty-four hours per week. The packers never work late in the afternoons or on dark days because of inadequate light, and it is the habit of some workers in other processes to come late in the mornings, to take extra time at the lunch period, and at times to leave early in the afternoons. Some do this because of home duties and others only because they are allowed to. It is of interest that some of the best-paid employees were these short-day workers.

Menstruation and Fecundity. The great divergence of opinion and the paucity of actual data in the literature on the effect of tobacco work upon the menstrual function indicated the importance of careful questioning in regard to this matter. Among 296 females so questioned we secured a history of dysmenorrhea in 42, of menstrual irregularities in 17, and of menorrhagia in only 2, while in 232 we obtained perfectly normal histories. These facts, with those for the individual processes, are presented in percentages in Table VI. It will be observed that in each group at least 75 per cent. of the histories were normal, thus suggesting that tobacco does not have a harmful influence upon this function.

The claim which has been made repeatedly, and which was apparently supported by Emerson and Tracy's⁴⁴ findings in New York, that women who work in tobacco give birth to few children, also suggested some inquiries along this line. Among 93 married

women we found only 50 who had ever given birth to a child, 53.8 per cent. (Table VII). The total number of children was only 95, this meaning an average of less than two to each mother and of about one to each married woman. Emerson and Tracy found in one group of 58 families an average of $1\frac{1}{2}$ to a family, and in another group of 53 families $1\frac{3}{4}$ to a family. While these figures seem convincing, they may at the same time be misleading, inasmuch as the superintendents whom we questioned about this were of the opinion that the cause lay in the frequent use among these people of means for the prevention of conception and in induced abortions. Furthermore, they were able to tell us of many families in which the mother worked in tobacco and in which there were the usual number of children. It will be noted that the statements of miscarriages, as also presented in Table VII, are not excessive.

TABLE VI.—MENSTRUAL HISTORIES OF 296 FEMALE WORKERS
ACCORDING TO PROCESSES AND AS A WHOLE, IN
PERCENTAGE AFFECTED.

Condition.	Cigar-makers.	Packers.	Strippers.	Banders.	All workers.
Dysmenorrhea	13.5	12.7	16.3	20.0	14.2
Irregularities	7.7	4.2	..	10.0	5.7
Amenorrhea	2.6	2.8	2.0	..	2.4
Menorrhagia . . . . .	..	..	4.1	..	0.7
Normal	77.0	83.0	77.5	75.0	78.4
Number	156	71	49	20	296

TABLE VII.—FECUNDITY OF 93 MARRIED WOMEN ACCORDING TO
PROCESSES AND AS A WHOLE.

	Cigar-makers.	Packers.	Strippers.	Banders.	All workers.
Number	51	12	24	6	93
Percentage having borne children	55.0	50.0	50.0	66.6	53.8
Average number of children per married woman	1.08	0.83	1.0	1.0	1.02
Average number of children per mother	1.96	1.67	2.0	1.5	1.9
Average number of miscarriages per married woman	0.31	0.08	0.04	0.17	0.2

PAST MEDICAL AND OPERATIVE HISTORY. The past medical histories revealed only that these workers had suffered from the usual diseases of childhood and adolescence. Measles had occurred in 55 per cent. of them, tonsillitis in 24, whooping-cough in 22.7, mumps in 19.2, and typhoid fever in 11 per cent. Influenza, scarlet fever, and diphtheria had each occurred in a little more than 10 per cent. Only the men were questioned as to gonorrhea and syphilis, and of these 12 admitted the Neisserian infection and 3 lues. The past operative histories indicated that tonsillectomies

and appendectomies were most frequent, and that the proportion of operations upon the men was less than half that upon the women. Among the latter there were 6 laparotomies for pelvic conditions and 6 uterine dilatations and curettements.

Weights and Measurements. The weights and certain anthropometric measurements were secured in each individual and the averages of these for the workers in each process, by sexes, together with general averages for each sex, are presented in Table VIII. It is appreciated that these figures are of little value except as they may be compared with similar observations upon workers in other industries, and it is hoped that we may at some time have such data upon all occupations.

TABLE VIII.—AVERAGE ANTHROPOMETRIC WEIGHTS AND MEASUREMENTS, BY SEXES, IN EACH PROCESS WITH GENERAL AVERAGES.*

	Males.					Females.				
	Cigar-makers.	Pack-ers.	Driers.	Cas-ers.	Aver- age.	Cigar-makers.	Pack-ers.	Strip- pers.	Band-ers.	Aver- age.
Weight	62.4	64.9	64.1	67.1	63.5†	58.0	54.8	61.0	56.6	57.6†
Height	169.6	169.1	169.0	166.0	169.3†	160.6	162.7	161.1	159.3	161.2†
Breadth of shoulders	38.2	39.2	39.1	39.6	38.7	36.2	35.9	36.9	36.1	36.2
Breadth of chest	26.5	26.9	27.3	28.3	26.9	25.3	24.6	24.3	25.5	25.0
Breadth of waist	25.4	25.8	27.2	28.2	26.0	22.3	21.6	22.8	22.0	22.2
Breadth of hips	32.1	32.1	33.7	33.8	32.5	34.1	33.3	34.0	33.0	33.8
Depth of chest	19.4	19.4	20.9	21.7	20.0	18.3	18.5	17.2	18.8	18.2
Depth of ab- domen	19.1	19.8	20.5	22.0	19.9	18.0	18.2	18.1	18.5	18.1
Girth of neck	35.1	35.2	35.7	34.9	33.0	31.7	31.1	32.0	31.2	31.6
Girth of chest contracted	84.8	85.1	91.7	89.5	86.1	80.8	79.4	80.8	82.7	80.6
Girth of chest expanded	91.2	92.0	97.0	94.6	92.4	85.8	85.5	87.3	87.3	86.1
Girth of waist	77.7	79.3	83.5	83.6	79.3	70.3	69.2	75.2	70.0	70.9
Girth of hips	92.3	94.2	96.6	93.9	93.9	97.5	95.1	102.6	97.0	97.7
Number	57	18	14	9	98	157	73	51	21	302

Build, Posture, Nutrition and Development. In regard to build, posture, nutrition, and development it is possible to record only the examiner's impressions, and these are stated in Table IX. It will be noted that in each instance the figures are better for the women than the men, but it must not be forgotten that the men

* Weights are expressed in kilograms and measurements in centimeters.

† 63.5 kg. = 140 pounds; 57.6 kg. = 127 pounds; 169.3 cm. = 66.7 inches; 161.2 cm. = 63.4 inches.

represent older age groups. Attention is also called to the fact that the driers and casers have the poorest build and posture but the best development; the explanation probably lies in their doing heavier manual labor than the others.

TABLE IX.—BUILD, POSTURE, NUTRITION AND DEVELOPMENT IN PERCENTAGE OF THE WORKERS IN THE SEVERAL PROCESSES, IN EACH SEX, AND IN THE TOTAL NUMBER.

	Males.					Females.					Total.
	Cigar-makers.	Pack-ers.	Driers.	Casers.	Total.	Cigar-makers.	Pack-ers.	Strip-pers.	Band-ers.	Total.	
Good	56.2	53.0	46.2	44.4	53.1	55.7	64.4	70.6	66.6	61.1	59.2
Fair	42.1	29.4	46.2	44.4	40.7	43.0	34.2	27.4	33.4	37.6	38.3
Poor	1.7	17.6	7.6	11.2	6.2	1.3	1.4	2.0	..	1.3	2.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

POSTURE.											
Good	63.1	61.1	35.7	44.4	57.2	71.2	72.2	60.8	76.2	70.0	66.8
Fair	19.3	22.2	21.4	33.4	21.4	21.8	22.2	31.4	23.8	23.7	23.1
Poor	17.6	16.7	42.9	22.2	21.4	7.0	5.6	7.7	..	6.3	10.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NUTRITION.											
Good	52.6	50.0	69.2	66.6	55.1	65.6	67.1	68.7	66.6	66.5	64.0
Fair	42.1	33.3	23.1	33.4	37.1	24.8	30.1	25.5	33.4	26.8	29.3
Poor	5.3	16.7	7.7	..	7.2	9.6	2.8	5.8	..	6.7	6.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

DEVELOPMENT.											
Good	50.9	37.5	92.3	87.5	56.8	61.0	59.4	60.8	81.0	62.0	60.7
Fair	42.1	56.3	7.7	12.5	36.9	37.1	33.4	35.2	19.0	34.6	35.2
Poor	7.0	6.2	..	..	6.3	1.9	7.2	4.0	..	3.4	4.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
No.	57	18	14	9	98	157	73	51	21	302	400

Physical Findings. The physical findings in percentages for the various groups are set forth in Table X. Congestion of the conjunctival mucous membrane was most frequent, and it was of such a grade as to suggest some cause inherent in the industry as at present conducted. It was observed that those who wore glasses were not so frequently affected, and this indicated a method by which this finding could be obviated. This subject will be amplified in a subsequent publication by T. B. Holloway, who made careful and exhaustive studies upon the eyes of some of these workers.

TABLE X.—PHYSICAL FINDINGS IN WORKERS, IN PERCENTAGE, ACCORDING TO SEXES AND PROCESSES AND AS A WHOLE.

	Males.					Females.					All workers.
	Cigar-makers.	Packers.	Driers.	Casars.	Total.	Cigar-makers.	Packers.	Strippers.	Banders.	Total.	
Conjunctival congestion . . .	65.4	72.2	64.4	77.8	64.4	46.6	67.1	64.8	76.2	56.6	58.5
Dental caries . . .	36.6	39.0	93.0	77.8	47.0	33.1	38.4	45.1	38.1	36.8	39.2
Dental wearing . . .	54.0	16.7	28.6	33.4	38.8	40.8	..	15.7	..	23.9	27.5
Dental insufficiency . . .	17.3	27.8	50.0	55.6	26.6	11.5	21.9	15.7	14.3	14.8	17.7
Pyorrhea . . .	15.4	33.4	71.5	22.2	26.6	8.9	..	7.8	4.8	6.3	11.2
Tremors of eyelids . . .	19.2	33.4	7.1	33.4	20.4	40.8	54.8	43.2	28.6	43.7	38.0
Palpable glands:											
Axillary . . .	55.8	72.2	52.2	55.6	56.2	31.8	23.3	3.9	23.8	24.5	32.2
Cervical . . .	30.8	39.0	42.9	33.4	32.7	13.4	27.4	9.8	4.8	15.6	19.7
Epitrochlear . . .	36.6	39.0	42.9	55.6	37.8	1.3	1.4	..	4.8	1.3	10.2
Pharyngeal congestion . . .	38.4	50.0	71.5	33.4	42.9	14.0	11.0	31.4	..	15.2	22.0
Tonsils:											
Disensed . . .	11.5	11.1	14.3	..	10.2	17.8	9.6	15.7	19.0	15.6	14.2
Enlarged . . .	5.8	5.6	7.1	11.1	6.1	21.7	9.6	7.8	9.5	15.6	13.2
Hyperactive reflexes . . .	5.8	..	..	..	3.1	7.6	32.9	11.8	9.5	14.6	11.7
Lungs: suspicious infiltration:											
Right apex . . .	11.5	16.7	21.4	..	12.3	8.3	16.4	11.8	14.3	11.3	11.5
Left apex . . .	3.8	5.6	..	..	3.1	1.3	2.7	2.0	4.8	1.9	2.2
Apical fibrosis . . .	1.9	5.6	7.1	..	3.1	1.3	..	2.0	..	1.0	1.5
Emphysema . . .	5.8	..	14.3	..	5.6	0.6	..	..	..	0.3	1.5
General fibrosis . . .	3.8	5.6	..	22.2	5.6	..	..	..	..	..	1.2
Thyroid fullness . . .	..	..	..	..	..	5.7	12.3	3.9	14.3	7.6	5.7
Heart:											
Mitral murmur:											
Systolic . . .	..	..	28.6	22.2	6.1	2.5	9.6	2.0	9.5	4.6	5.0
Presystolic . . .	..	..	..	..	..	0.6	..	3.9	..	1.0	0.7
Aortic systolic murmur . . .	..	..	..	..	..	..	..	..	4.8	0.3	0.2
Pulmonic murmur . . .	..	..	..	..	..	..	4.1	3.9	..	1.7	1.2
Weak heart sounds . . .	11.5	5.6	..	..	7.1	1.3	..	..	9.5	1.3	2.7
Arrhythmia . . .	..	..	..	..	..	0.6	4.1	3.9	..	2.0	1.5
Arteriosclerosis . . .	11.5	5.6	21.4	..	10.2	..	..	..	..	..	2.5

Various dental abnormalities occupy second place in our classification. There were 157 who showed gross dental caries, and 110, or 27.5 per cent., presented a wearing away of the biting and grinding surfaces of all their teeth, such as is seen in men who have chewed tobacco for a long time. It is interesting that this occurred in the females as well as in the males, but that among the women it was seen only in those working in processes in which tobacco could be placed in the mouth, the cigarmaking and stripping departments. The banders and packers handle only finished cigars and so have no opportunity of getting tobacco into the mouth.

and none of the females in these processes showed dental wearing. Among the men instances were found in every process, but the men handle raw tobacco in all their departments, and even when their teeth do not aid them in their skilled work they keep tobacco in their mouths. Some, even of the girls, after a year or less of work in tobacco will show this dental wearing; and some of those who have worked five or more years and who constantly use their teeth show the latter worn almost half down to the gum margins. The tobacco contains a certain amount of gritty material, sand and organic matters, and it seems likely that enough of this gets upon the teeth, even by licking the binders and wrappers, to slowly grind down the biting and chewing surfaces when they are approximated, as might emery. A second factor in its production may be simply the biting together of the teeth, as in biting out bunches. Seventy-one of the workers showed what we have arbitrarily termed an insufficiency of teeth, indicating a loss of five or more. Pyorrhea was present in 11.2 per cent.

Because of the significance which some clinicians attach to tremors of the eyelids when lightly closed as indicative of neurotic conditions data were secured upon the presence of this phenomenon, showing 38 per cent. to be so affected. Hyperactive reflexes might be expected to correspond roughly with the presence of these tremors if they are suggestive of a neurotic state, but were found in only 11.7 per cent.

The pharynx was congested in 22 per cent., and in some it was quite dry and glistening. As many of the workrooms have a low humidity with a somewhat high temperature, and as tobacco dust is quite hygroscopic, this finding is readily explained. The banders work in the cleanest, the least dusty, and the best ventilated rooms, as is shown by Smyth and the writer, and among these there was not found a single instance of pharyngeal catarrh.

Abnormal tonsils were discovered in 27.4 per cent. of the employees examined. In 13.2 per cent. the tonsils were simply enlarged, while in 14.2 per cent. they were cryptic and diseased.

It is very difficult to differentiate between normal and slightly abnormal findings in the lungs, and if we have erred in this regard we believe that it has been in placing too many in the abnormal or doubtful class. Although the predominance of right-sided apical lesions presented in our table suggests that we have done this, our figures nevertheless represent our impressions at the times of the examinations. We found 46 with what we considered slight right apical pulmonary infiltration and 9 with the same on the left side. In none of these did we get rales and none had sputum. In 6 other instances the signs of old inactive apical infiltration were unquestionable, 3 in males and 3 in females. Emphysema was noted 6 times, and signs of a general fibrosis 5 times; all the latter were men.

Heart examinations revealed a mitral systolic murmur in 20 instances, weak heart sounds in 11, an arrhythmia in 6, a pulmonic

systolic murmur in 5, a mitral presystolic murmur in 3, and 1 aortic systolic murmur. In no case was decompensation present. No instances of marked arteriosclerosis were detected, but a few of the workers showed it in mild degree.

Blood-pressure studies were made upon 147 employees, using the auscultatory method, and the averages are presented in Table XI. The lowest average systolic reading for any group was 118 for the female cigarmakers and the highest 131 for the casers. All the diastolic averages ranged between 73 and 85.

TABLE XI.—BLOOD-PRESSURE AVERAGES ON 147 WORKERS.

	Males.					Females.				
	Cigar-makers.	Packers.	Driers.	Casers.	Total.	Cigar-makers.	Packers.	Strippers.	Banders.	Total.
Number studied	30	14	11	9	64	78	33	27	9	147
Average systolic pressure	124	130	130	131	128	118	121	127	127	121
Average diastolic pressure	80	82	80	73	81	78	82	85	74	81

Diagnosis. Some of the physical conditions presented in Table X, such as dental caries and diseased tonsils, constitute in themselves diagnoses, but others can be so interpreted only in the light of the clinical history and examinations in the individual worker. The latter conditions, such as pulmonary infiltration and thyroid fulness, have been reconsidered in this light and in those instances where diagnoses seemed justified they were recorded and are presented separately in Table XII. This table also includes such other diagnoses as we have been able to make. Because of our limited study some of these are only symptoms, but insofar as possible we are presenting etiological diagnoses.

Chronic constipation stood first among the diagnoses, being present in 19.2 per cent. of the total number. It was most frequent in the females, and among them most often in the cigarmakers and the strippers. The packers, who stand constantly at their work, showed only a slightly lower percentage than the strippers among the females, but there was none among the male packers. The banders showed the lowest percentage, although they sit at their work.

Headaches, exclusive of those due to menstrual or other transient conditions, were complained of 45 times. Among the females 13.7 per cent. suffered in this way as against 5.1 per cent. among the males. Some of them were no doubt due to eye-strain, as was suggested by several of the girls telling us of similar headaches which they had had and which disappeared after they had been glassed. All of these workers with obscure headaches were advised to secure eye examinations; and we have records of a few in which

this was done and refractive errors were found. It is possible that some of the headaches were due to fatigue or the toxic effect of tobacco, but of this we have no proof.

TABLE XII.—DIAGNOSES, ACCORDING TO SEXES AND PROCESSES, IN PERCENTAGE OF WORKERS AFFECTED.

Diagnoses.	Males.				Females.				All work-ers.
	Cigar-makers.	Packers.	Drivers.	Cassers.	Cigar-makers.	Packers.	Strippers.	Banders.	
Constipation	8.8	..	7.1	22.2	31.2	15.1	15.7	4.8	19.2
Apparently normal	12.3	16.7	..	11.1	8.9	16.4	21.6	4.8	12.2
Headache	7.0	..	7.1	..	13.4	5.5	7.8	52.4	11.2
Gastric neurosis	3.5	..	14.3	22.2	11.5	4.1	2.0	..	7.0
Neurasthenia	3.5	5.0	..	..	7.0	2.7	4.0	..	4.4
Slight hypertension . . . . .	..	5.0	..	..	0.6	8.2	5.9	4.8	3.0
Pelvic inflammation . . . . .	..	..	..	..	3.2	4.1	7.8	..	3.0
Secondary anemia . . . . .	..	..	..	..	3.8	1.4	5.9	..	2.5
Backache	3.5	..	..	..	1.3	..	..	9.5	1.5
Conjunctivitis . . . . .	..	..	7.1	..	1.9	..	..	9.5	1.5
Arrested pulmonary tuberculosis	1.8	5.0	7.1	..	1.3	..	2.0	..	1.5
Questionable active pulmonary tuberculosis	1.8	5.0	..	..	1.3	2.7	..	..	1.2
Vasomotor neurosis	1.8	5.0	..	..	1.9	..	..	..	1.2
Chronic appendicitis . . . . .	..	..	..	11.1	1.3	1.4	..	..	1.0
Chronic bronchitis	5.3	..	..	..	..	..	2.0	..	1.0
Eczema	1.8	..	..	..	1.9	..	..	..	1.0
Pregnancy . . . . .	..	..	..	..	1.3	1.4	..	..	0.7
Toxic goitre . . . . .	..	..	..	..	1.9	..	..	..	0.7
Early nephritis . . . . .	..	..	..	..	0.6	1.4	..	4.8	0.7
Brachial neuritis	1.8	..	..	..	1.3	..	..	..	0.7
Acne vulgaris	1.8	..	..	..	0.6	..	2.0	..	0.7
Blepharitis	1.8	..	..	..	0.6	..	..	..	0.5
Gastroduodenal ulcer	3.5	..	..	..	..	..	..	..	0.5
Bronchial asthma	1.8	..	..	..	..	1.4	..	..	0.5
Cirrhosis of liver	3.5	..	..	..	..	..	..	..	0.5
Sacro-iliac strain	1.8	..	..	..	..	..	2.0	..	0.5
Urethral stricture	3.5	..	..	..	..	..	..	..	0.5
Intestinal adhesions . . . . .	..	..	..	..	0.6	..	..	..	0.2
Toxic arthritis . . . . .	..	..	..	..	..	1.4	..	..	0.2
Cholelithiasis . . . . .	..	..	..	..	0.6	..	..	..	0.2
Epididymitis	1.8	..	..	..	..	..	..	..	0.2
Angina pectoris	1.8	..	..	..	..	..	..	..	0.2
Frontal sinusitis . . . . .	..	..	..	..	0.6	..	..	..	0.2
Paresis of right external rectus . . . . .	..	..	..	..	0.6	..	..	..	0.2
Trachoma . . . . .	..	5.0	..	..	..	..	..	..	0.2
Number	57	18	14	9	157	73	51	21	400

Among the gastric neuroses we have grouped all those instances of gastric disturbance in which we did not believe that there was an organic lesion. In spite of the high percentage of such cases reported by others we found only 7 per cent. to be so affected, and none of these showed a marked disturbance. The diagnosis of gastroduodenal ulcer was twice made.

A secondary anemia was found ten times. The diagnosis was based upon the history, the physical appearance, and a study of blood smears. No hemoglobin estimations were made because of the difficulties of making accurate determinations under the circumstances of our work.

Backache was complained of by only 6 workers, of whom 4 were cigarmakers and 2 banders. Although many seemed to sit in strained positions there were backs to most of the seats, and this was doubtless a large factor in eliminating this complaint. In only 2 instances could a diagnosis of sacro-iliac strain be made.

Old inactive tuberculous lesions of the lungs were discovered 6 times, and active pulmonary tuberculosis was suspected in 5 of the 55 individuals in whom there were questionable physical signs of apical infiltration. In these 5 the physical signs alone were little more conclusive than in the others, and none had sputum, but some had a slight temperature elevation and all of the 5 were losing weight, were anemic, or had vague gastric disturbances. This small number of instances of tuberculosis agrees with Dembo's⁴⁶ finding of only 8 in her examination of 600 female tobacco workers, and with her cases gives a percentage of 1.3 for 1000 tobacco workers. In view of this small proportion of tuberculous pulmonary infections among these workers it is difficult to understand the high mortality rate of tobacco workers from this cause. It is possible of course that in some of those in whom we found vague signs at one or the other apex, and whom, because they were without symptoms of any kind, we have not included in this grouping, death may finally occur from tuberculosis. Another possibility is that working conditions have greatly improved in recent years, and that it was these conditions rather than the tobacco itself which caused the high tuberculosis mortality.

Attention is called to the 4 cases of eczema observed, in only two of which, however, was the lesion upon the hands. Knowles⁴⁶ has seen 9 instances of eczema upon the hands and fingers of tobacco workers and thinks it is probably due to the irritating effects of nicotine.

Although 7.6 per cent. of all the females showed some fulness of the thyroid gland, in only three of them could we elicit any signs of thyroid intoxication, and these were slight and questionable. Our diagnoses have been limited to these 3 cases, 0.7 per cent. of the total number and 1 per cent. of the women.

Brachial neuritis, although very mild in type, was diagnosed 3 times, and in each instance it was in a cigarmaker. Two cases of arm pains and one of leg pains in cigarmakers were recently reported by the State Board of Labor and Industries of Massachusetts,⁴⁷ and Dr. David Edsall informs the writer that he has seen a number of other cases at his clinic in Boston. Inasmuch as all our cases and some of the others occurred in a single process it is probable that the neuritis is mechanical rather than toxic in origin.

In only 12.2 per cent. of the workers were we unable to find any defects or symptoms, and for these we have entered diagnoses of "apparently normal," recognizing that it is impossible to say with certainty what is normal.

CONCLUSIONS. 1. The literature upon the effects of working in tobacco favors the view that it predisposes the worker to pulmonary tuberculosis, gastro-intestinal disturbances, anemia, genital abnormalities, and nervous conditions.

2. In a study of the social and medical conditions of 400 cigar workers in Philadelphia we did not find support for any of these contentions.

3. We did find, however, some wearing of the teeth and some pharyngeal and conjunctival congestion, findings which we believe to be dependent upon faulty personal and factory hygiene.

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ELECTROCARDIOGRAPHIC OBSERVATIONS IN TOXIC GOITRE.

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THE importance of cardiac signs and symptoms in exophthalmic goitre has been a matter of common knowledge since the earliest description of this disease by Parry¹ in 1786. Tachycardia, palpitation, forcible heart action, and less often cardiac arrhythmia are such important factors in the syndrome that Möbius² was led to the dictum that "Basedow patients suffer and die through their hearts." It is only within the past decade or so, however, that the cardiac symptoms have been generally considered as due to thyrotoxic influences, rather than wholly or in part due to embarrassment of the right heart following an often hypothetical pressure on the trachea by the enlarged thyroid gland. As this condition constitutes a relatively simple example of an endogenous intoxication, it has seemed advisable to study the changes produced in the electrocardiogram by the intoxication of this disease, with the additional hope that further light might be thrown both on the resulting cardiac condition and on the changes produced in it by surgical operations on the thyroid.

METHOD. To this end electrocardiograms were taken on 51 goitre patients seeking surgical relief, in as many cases as possible both before and at short and long periods after operation. Information was sought not only as to the rate and rhythm of the heart action in both simple and toxic goitre cases, but also as to the relative size of the chambers of the heart and to other changes in the form of the ventricular complexes of the electrocardiogram